



FORMULATION & EVALUATION OF HERBAL SHAMPOO FOR HAIR ALIMENT

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Abstract- Current experimental work has been undertaken to study the effect of herbal components for complete nourishment of hair. Now a day cosmeceuticals are considered as luxury indulgences which play a profound role in our daily lives. Herbal cosmetics are made using plant extracts or parts of plants that have cosmetic gains; are generally milder and less toxic than synthetic cosmetics. Hair cosmetics are important for maintaining healthy and aesthetically pleasing hair. They play a crucial role in cleansing, conditioning, moisturizing, and protecting hair from damage, also enhancing its appearance and overall health. Herbal shampoos for hair growth are formulated to strengthen the hair follicles by delivering essential oils and nutrients through the roots and hair follicles. It then stimulates the formation of new and healthy hair roots and promotes healthy hair growth. Hair structured of fibrous proteins, amino acids are building blocks of protein. Developed herbal shampoo contains ingredients like hibiscus extract, soya milk, fenugreek which are source of amino acids. In addition to this formulation has Onion extract rich in Sulfur; Sulfur is involved in the production of keratin and collagens, both are crucial for hair growth and development. Incorporation of Neem extract and Onion extract in formulation provides protection against dandruff and fungal infections. The preparation was evaluated for various parameters, such as color, odor, flow ability, pH, spread ability, wash ability, dirt dispersion and foam ability. The results from the evaluation showed that the shampoo had satisfactory action and found nonirritant to skin plus imparting shine to hair. Thus, the prepared stable herbal shampoo formulation is cost effective, contributes to healthy and overall nourishment of hair naturally.

Key words: Herbal shampoo, Cosmeceuticals, Hair follicle, Sulfur, Antidandruff etc.

Introduction

Cosmetic is defined as the product applied to human body for cleansing, beautifying, promoting attractiveness, or altering the appearance without affecting the body structure or functions. Now a day cosmetic are considered as luxury indulgences which play a profound role in our daily lives. A Cosmetic is any substance used to clean improve or change the complexion, skin, hair, nails or teeth. Herbal cosmetics are made using plant extracts or parts of plants that have cosmetic gains and are generally milder and less toxic than synthetic cosmetics. Cosmeceuticals have medicinal benefits which affect the biological functioning of skin depending upon type of functional ingredients they contain ^[1]. Beyond enhancing our physical appearance, cosmetics hold the power to boost our confidence and nurture our sense of self-care and our overall hygiene. Hair cosmetics are important for maintaining healthy and aesthetically pleasing hair. They play a crucial role in cleaning, conditioning, moisturizing, and protecting hair from damage, also enhancing its appearance and overall health. Having healthy hair allows us to look our best and ensure our hair and scalp is healthy. It plays a significant role in defining appearance. Well-maintained and healthy hair can enhance your overall look, making you feel more attractive and put-together ^[2]. It frames your face, complements your features, and adds a touch of elegance to your style. Hair is a symbol of beauty for a long time. Women with long and straight hair were considered beautiful. So to keep hair healthy, one needs some additional stuff to nourish your hair, provide essential nutrients and maintain its strength and beauty. Using recommended Hair Cosmetics such as shampoos, conditioners, and treatments one can take care of hair in short span of time. Hair Cosmeticeuticals assist in preventing damage from everyday factors like pollution, dry weather, heat styling, and other environmental stressors. One of these Hair Cosmetics is hair shampoo which plays vital role in maintaining strong and nourished hair.

Shampoo is a hair care product, typically in the form of a viscous liquid, which is formulated to be used for cleaning (scalp) hair. Shampoo is used by applying it to wet hair, massaging the product in the hair, roots and scalp, and then rinsing it out. Shampoo is used to remove the unwanted build-up of sebum (natural oils), dirt in the hair without stripping out so much as to make hair manageable. Shampoos can be broadly categorized into synthetic and natural/ herbal types, based on their ingredients and formulation. Synthetic shampoos primarily use lab-created chemicals for cleaning and conditioning e.g. sodium lauryl sulfate or sodium laureth sulfate, with a co-surfactant, most often cocamidopropyl betaine in water. While natural shampoos rely on plant-derived extracts, essential oils, and other naturally sourced components like hibiscus, amla, reetha, fenugreek, aloe etc.

Other than synthetic and natural, shampoos can be of varied types depending upon its functionality as follows ^[3]:

- Clarifying shampoo- To cleanse the hair
- Moisturizing shampoo- To moisturize hair
- Sulphate free shampoo- To prevent excessive oil loss
- Colour safe shampoo- To color hair
- Volumizing shampoo- To raise the volume of shampoo
- Anti dandruff shampoo- To prevent dandruff
- Anti-fungal shampoo- To reduce fungal growth
- Strengthening shampoo- To strengthen the hair
- Baby shampoo- Used for children
- Medicated shampoo- To serve medicinal purpose
- Dry shampoo- Dry shampoo doesn't need water, it typically comes in powder or aerosol spray form
- Leave in shampoo/ leave-in conditioner - Hair care product that is applied to the hair after washing and left in, without rinsing, to provide continuous moisture, detangling, and protection
- Organic/Natural shampoo- Herbal shampoo containing herbal ingredients
- Curl enhancing shampoo- These shampoos enhance curls and waves providing extra shine and frizz defense

➤ **Ideal Properties of Shampoo** ^[4]

Shampoo should

- Clean the hair thoroughly and remove dirt, sebum and excess oil.
- Generate sufficient foam to aid in even application and cleansing.
- Be easily removed by rinsing with water.
- Leave the hair non-dry, soft, and lustrous with good, manageability.
- Impart a pleasant fragrance to the hair.
- Be gentle on the hands, without causing dryness or roughness.
- Be safe for the skin, eye and free from any side effects or irritation

Herbal Shampoo ^[4, 5] - Natural shampoos are formulated with plant-based extracts and other natural ingredients. Herbal shampoos are gaining popularity because of the belief that herbal shampoos are safe and free from side effect as they contain bio-dregredable materials rather than harsh chemicals. Their key advantage is delivering long-lasting, effective results without the use of chemicals, making them gentle and safe for the hair. It helps hair to improve their quality of moisture, growth, thickening, strength of hair roots. The herbal shampoos are better in performance & safer than the synthetic shampoos, as herbal shampoos won't irritate the skin or scalp that may happen with synthetic shampoos and are non-allergic product which make it suitable for all skin type including sensitive & allergy prone skin.

Now a days Onion shampoos are getting more attention and are marketed frequently. Onions are a kitchen staple but it's a powerhouse for hair health. Herbal shampoos containing onion extract or juice have several benefits like reduces hair fall, boosts hair growth, tackles dandruff, maintains scalp pH balance, enhances shine and softness, treats itchy scalp, reduces inflammation, helps fight with premature greying, acts as a natural conditioner, prevents split ends etc.

These advantages of onion shampoos can be attributed to Sulfur present in onions. Hair consists of root and shaft. Shaft is outer visible part of hair and its structure is divided into three primary parts the cuticle, cortex and medulla. Cuticle is outermost layer of hair that protects the inner layers of the hair strand and is responsible for shine and smoothness. Keratin is fibrous protein; it forms long, thread-like structures. Keratin is composed of amino acids cysteine, serine, glycine etc. amino acids are linked together by peptide bonds. Chemically hair structure is a complex interplay of proteins, primarily composed of protein keratin, held together by different types of chemical bonds like Sulphur bonds, Hydrogen bonds. Disulfide bond formed between cysteine amino acids, contribute to the hair's strength and shape. The specific arrangement and bonding of these amino acids contribute to keratin's strength and flexibility. Sulfur is a vital building block of keratin, the primary protein in hair. Adequate sulfur levels help strengthen hair strands, making them less prone to breakage and damage, sulfur helps improve hair's elasticity, allowing it to stretch and bend without breaking. Sulfur is involved in the production of keratin and collagens, both are crucial for hair growth and development. Sulfur has anti-inflammatory and antimicrobial properties that can help maintain a healthy scalp. By reducing inflammation and strengthening hair follicles, sulfur can potentially play a role in preventing hair loss.

➤ **Advantages of Herbal Shampoo**

Herbal shampoos are

- ✓ non - toxic
- ✓ easily available
- ✓ cheaper in price
- ✓ eco friendly
- ✓ not causing redness, itching, irritation, and harmful
- ✓ use pure organic ingredients there are no additive surfactant

➤ **Functions of Herbal Shampoo**

- ❖ Herbal shampoos can soothe and calm indignant scalps, lowering infection and itching.
- ❖ Certain herbs, inclusive of tea tree oil and neem, have antifungal and antibacterial properties, helping to manipulate infections and promote a healthful scalp.
- ❖ Herbal shampoos can offer comfort from psoriasis and eczema signs, including redness, scaling, and itching.
- ❖ Natural shampoos can efficiently easy the hair and scalp, eliminating dust, oil, and impurities.

- ❖ Herbal shampoos can assist stability the pH of the scalp, reducing infection and promoting a healthy environment.

Materials/ Herbs ^[6, 7, 8, 9]

a. ONION EXTRACT


Generic Name	Allium cepa	
Synonym	Onion	
Family	Amaryllidaceae	
Role as cosmeceutical	Onion juice promotes hair growth by increasing blood circulation to the scalp, can stimulate hair follicles. The sulfur in onions helps strengthen hair strands, reduce breakage, and prevent hair fall, antimicrobial and antifungal properties, can lead to thicker, shinier hair by nourishing the hair follicles and improving the overall health of the hair and scalp, prevent premature greying due to its antioxidant properties and ability to optimize the hair growth cycle.	

Figure 1

b. HONEY


Generic name	Obtained from Apis Mellifera	
Synonym	Honey	
Family	Name of bees Apidae	
Role as cosmeceutical	moisturizes dry hair and scalp, reduces hair breakage, restores shine, improves condition of natural hair, reduces frizz, softens hair	

Figure 2

c. NEEM


Generic name	Azadirachta indica,	
Synonym	Neem, Margosa	
Family	Meliaceae	
Role as cosmeceutical	Neem provides a cooling effect to the scalp and promotes smooth hair growth, antifungal, antidandruff activity	

Figure 3

d. HIBISCUS


Generic name	Hibiscus rosa-sinensis	
Synonym	China rose,	
Family	Malvaceae	
Role as cosmeceutical	promotes hair growth, prevents hair fall, and adds shine and luster to hair	

Figure 4**e. REETHA**


Generic name	Sapindus mukorossi	
Synonym	Soap nut, reetha	
Family	Sapindaceae	
Role as cosmeceutical	Cleanses and promotes healthy hair growth due to its saponin content, which creates a natural lather.	

Figure 5**f. SHIKAKAI**


Generic name	Acacia concinna	
Synonym	Shikakai, soap pod	
Family	Leguminosae	
Role as cosmeceutical	Natural shampoo and conditioner, known for its cleansing and conditioning properties, promotes hair growth, reduces dandruff, and make hair soft and shiny.	

Figure 6**g. NAGARMOTHA**


Generic name	Cyperus rotundus	
Synonym	Nut Grass	
Family	Cyperaceae	
Role as cosmeceutical	Stimulates hair growth and improve scalp health, help control dandruff and reduce excessive dryness of the scalp. Nagarmotha oil can be massaged into the scalp for nourishment.	

Figure 7

h. FENUGREEK


Generic name	Trigonella foenum-graecum	
Synonym	Methi	
Family	Fabaceae	
Role as cosmeceutical	Addresses hair loss, dandruff (because of anti-fungal property), and dryness moisturize and condition the hair, reducing dryness and breakage, often as a paste or hair mask, applied to the scalp to nourish the hair follicles and improve overall scalp health.	

Figure 8**i. SOYAMILK**


Generic name	Glycine max	
Synonym	Soybeans	
Family	Fabaceae	
Role as cosmeceutical	Used in hair treatments due to its protein content, help strengthen hair, improve moisture retention, and potentially reduce hair breakage.	

Figure 9**j. XANTHAN GUM**


Generic name	Xanthan gum	
Synonym	Bacterial Polysaccharide or Corn Sugar Gum,	
Family	-	
Role as cosmeceutical	acts as a binder, thickener, and stabilizer to improve texture and keep ingredients from separating	

Figure 10**k. SODIUM LAURYL SULPHATE**

SLS is a surfactant, lowers the surface tension between interfaces of the ingredients and acts a cleansing and foaming agent. SLS is used in beauty and self-care products as well as in household cleaner.

l. METHYL PARABEN

Methylparaben is a preservative, primary function is to inhibit the growth of bacteria, mold, and yeast, thereby extending the shelf life of products. Widely used in cosmetics, personal care products, medications, and some processed foods.

m. ROSE WATER

Rose water is used in hair treatment because of its attributes like moisturizing, soothing the scalp, reducing dandruff, and promoting hair growth due to its anti-inflammatory, antimicrobial, and antioxidant properties. It can be used to rinse hair, added to shampoo or conditioner, or applied directly to the scalp.

n. JASMINE OIL

Jasmine oil used in hair care products for its fragrance. Regular use of jasmine oil can make your hair soft, silky, more manageable and can stimulate hair growth.



➤ **Formulation****Table 1: Formulation Ingredients of shampoo**

S.n.	Ingredients	Quantity	Category
1	Onion extract	10ml	Antidandruff, Nourishing agent
2	Honey	1.25ml	Moisturizer
3	Neem	1.25ml	Antidandruff
4	Hibiscus	1.25ml	Anti hair fall
5	Reetha	2.5gm	Cleansing and shining agent
6	Shikakai	2.5gm	Conditioning and cleaning
7	Nagarmotha	2.5gm	Scalp nourishment
8	Fenugreek	1.25gm	Antifungal
9	Soyamilk	2.5gm	Reduce hair breakage
10	SlS(7.5%)	1.9gm	Cleaning agent
11	Methyl paraben	q.s.	Prservative
12	Xanthan gum	q.s. (0.3%)	Thickening agent
13	Rose water	q.s.	Vehicle
14	Jasmine oil	q.s.	Fragrance

Method of Preparation ^[8]

- A. Firstly extracts of Onion, Hibiscus, Neem, Reetha, Shikakai, Nagarmotha were prepared as follows:
- Onion Extract- Onion were peeled and chopped, subjected to mixer to get the juice. The liquid concoction was strained to get the pure extract.
 - Hibiscus extract- Put the hibiscus petals in a 50 ml water bath and boil for ten to fifteen minutes. After letting it cool, filter the liquid to extract the hibiscus petals.
 - Neem extract- Put the neem leaves in a 50 ml water bath and boil for ten to fifteen minutes. After letting it cool, filter the liquid to extract the leaves.
 - Reetha extract- The reetha was soaked in 100ml of water overnight. Boil the soaked reetha in the same water for approximately 20 minutes the next day, filter the mixture to get reetha extract.
 - Shikakai extract- The Shikakai was soaked in 100ml of water overnight. Boil the soaked Shikakai in the same water for approximately 20 minutes the next day, filter the mixture to get Shikakai extract.
 - Nagarmotha extract- The Nagarmotha was soaked in 100ml of water overnight. Boil the soaked Nagarmotha in the same water till the water quantity sufficiently reduced, filter the mixture to get Nagarmotha extract. Or Nagarmotha extract can also be obtained by boiling the Nagarmotha powder in coconut oil.
 - Fenugreek seeds were soaked overnight in small amount of water.
- B. Xanthan gum was dissolved in rose water; to this all the extracts were added one by one and stirred well to form uniform mixture.
- C. Honey, Fenugreek water, soya milk was dissolved

D. Sodium lauryl sulphate was added to above mix to get good cleansing action and Methyl paraben and jasmine oil were added in quantity sufficient. Final product was packed in well closed plastic container and stored to check the stability.



Figure 11: Formulation of Herbal Shampoo

Evaluation parameter of herbal shampoo:

1. **Physical Appearance/ Visual Inspection:** The formulation prepared was evaluated for colour, odour, fluidity and consistency
 - i. Color: Shampoo prepared was found to be brown colored.
 - ii. Odor: Shampoo had characteristic odor of jasmine oil.
 - iii. fluidity: Preparation was flow able.
 - iv. Consistency: Consistency of the preparation was found to be even visually.
2. **Determination of pH:** The pH of herbal shampoo formulation was determined by using digital pH meter. 1 ml of shampoo was taken and dispersed in 10 ml of distilled water and keep aside (takes about 30 second to 2 minutes). The pH of herbal shampoo formulation was found to be in range of 6.5-7.0
3. **Dirt Dispersion:** Two drops of shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.
Herbal shampoo showed minimum of ink in foam showing good cleansing/ dirt removal from hair.
4. **Foaming Ability and Foam Stability:** The foaming ability was measured using the cylinder shake method. A 100 ml measuring cylinder was filled with 20 ml of the 1% shampoo solution, covered with a hand, and shaken ten times. Following a minute of shaking, the total quantities of the foam contents were noted. Only the foam volume was computed. The volume of foam was immediately measured for four minutes, at one-minute intervals. Foam of the shampoo was small and dense.
5. **Skin irritation test:** A tiny amount of shampoo was applied to the skin and observed for any localized discomfort or inflammatory response to test for skin irritation after a little while and the formulation found to be no irritable
6. **Washability:** Small quantity of shampoo was applied on hair and washed with water after few minutes and found to be washable.

Result and discussion

Hair cosmetics are not just about aesthetics; they are a vital part of a comprehensive hair care routine that contributes to the health, strength, and beauty of hair. Herbal shampoo preparation was formulated based upon traditional knowledge with the objective to formulate a stable and functionally effective preparation and found to be satisfactory after evaluation. The formulation in current study was stable with brown colored and jasmine perfume. The shampoo preparation had even flow ability and having a PH in range of 6.5-7.0. Further the formulation showed good cleansing badge with the dirt dispersion test and sufficient wash ability thus easily removable preparation from hair. At the same time our formulation was found nonirritant.

Conclusion:

Herbal cosmetics are easy to prepare, safe and effective after use. One of the main objectives of herbal products is that they can be used for all. The major use of herbal products is for health promotion with no untoward effects. Developed herbal formulation in present study, contains Onion juice, onion are rich source of Sulfur. Sulfur in onions contributes to strengthen hair strands (as Sulfur is present in Keratin and Keratin is prime protein in hair cuticle), reduce breakage, prevent hair fall (Onion juice increase blood circulation to the scalp, can stimulate hair follicles) and improves the overall health of the hair and scalp, prevent premature greying due to its antioxidant properties and ability to optimize the hair growth cycle. Honey responsible for hydration of hair, Incorporation of Reetha (anti-inflammatory, antibacterial) and Shikakai (Saponins, vita A, D, and antioxidant) imparts cleansing, shining, conditioning action to shampoo. Shampoo can help in reducing hair fall as it has Hibiscus extract (rich in amino acids like lysine, arginine and leucine, crucial for keratin production) while soyamilk has abundant proteins can lower the hair breakage. Neem leaves extract has high antifungal properties thus counteract on dandruff and fungal infection. Nagarmotha is loaded with compounds like cyperene, cyperone, and rotundone, which are believed to stimulate hair follicles and promote growth giving scalp nourishment. Fenugreek contains several components beneficial for hair health like protein, iron, lecithin, flavonoids, saponins, and mucilage thus methi water added in preparation can reduce hair dryness, breakage, also Fenugreek has anti-inflammatory and antifungal properties, which can contribute to scalp health and potentially promote hair growth. Effective cleansing of action of herbal shampoo can be attributed to surfactant, reetha, shikakai.

So, current formulation can cleanse the scalp, help combat dandruff, remove dirt, and strengthen hair from the roots, conditions hair, potentially leading to healthier, shinier, more manageable and fuller hair.

At conclusion our herbal formulation has ingredients that may contribute to properties like hair follicle stimulation, fight against dandruff and scalp infection, effective cleansing of hair and scalp, set forth shine, conditioning and can be responsible for overall nourishment of hair and scalp. Prepared shampoo is easy to use, non-irritant and all the herbs are easily available making formulation value driven. Thus, herbal products having natural cosmeceuticals represent promising approach for effective hair aliment.

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